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A study of the shipment of produce to Department of Defense customers in Korea

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THESIS

A STUDY OF THE SHIPMENT OF PRODUCE TO DEPARTMENT OF DEFENSE CUSTOMERS IN KOREA

by

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The Department of Defense (DoD), through the Defense Supply Center Philadelphia, procures and ships a variety of subsistence items to locations worldwide, including customers in the Western Pacific. Historic problems associated with shipments of perishable items include high transportation costs, spoilage, and irregular deliveries.

This thesis documents and analyzes the processes currently used for shipments of produce to various DoD customers in Korea. Recent innovations in information management, controlled atmosphere container technology, "push" logistics, and global sourcing are discussed in addition to other possible enhancements that could improve customer service and cost effectiveness.

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A STUDY OF THE SHIPMENT OF PRODUCE TO DEPARTMENT OF DEFENSE CUSTOMERS IN KOREA

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ABSTRACT

The Department of Defense (DoD), through the Defense Supply Center Philadelphia, procures and ships a variety of subsistence items to locations worldwide, including customers in the Western Pacific. Historic problems associated with shipments of perishable items include high transportation costs, spoilage, and irregular deliveries.

This thesis documents and analyzes the processes currently used for shipments of produce to various DoD customers in Korea. Recent innovations in information management, controlled atmosphere container technology, "push" logistics, and global sourcing are discussed in addition to other possible enhancements that could improve customer service and cost effectiveness.

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I. INTRODUCTION

The Department of Defense (DoD), through the Defense Supply Center Philadelphia (DSCP), procures and ships a variety of subsistence items to locations worldwide, including to customers in the Western Pacific. Delivering a quality product to the right location, at the right time, and at an efficient cost can be an extremely challenging proposition in any event, but even more so when dealing with overseas customers. Apart from the obvious difficulties with perishable items, there are numerous political and cultural issues, both internal and external to DoD, which must be considered. The ever-present need to reduce costs adds even more complexity to an already formidable task.

Historic problems associated with overseas shipments of subsistence have included high transportation costs, spoilage, and irregular deliveries. [Kerber 97] This thesis analyzes the processes in place for shipments of produce from the continental United States (CONUS) to various DoD customers in South Korea. Possible enhancements are identified that could reduce historical problems as well as improve customer service and cost effectiveness.

A. RESEARCH QUESTIONS

This thesis addresses the following questions:

1. **How can the process of shipping produce to South Korean Defense Commissary Agency (DECA) customers be improved?**

After outlining the current process and attempting to measure its effectiveness, this thesis makes recommendations to reduce problems and enhance the distribution process based on best-business practices of both DSCP and private sector operations.

2. **What are the current processes for ordering/shipping produce from CONUS to South Korean DECA customers?**

There is currently no detailed documentation to describe the distribution of produce from CONUS to South Korean DECA customers from origin of a requirement to the receipt of a product. [Kerber 97] This thesis provides a detailed outline of the process for both surface and air shipments to Korea while also identifying possible enhancements.

3. **What are DSCP's current measures of success for shipments of produce to South Korea?**

This thesis identifies DSCP's measurements for success for shipments of produce to South Korean DECA customers

(e.g. customer service levels, meeting required delivery dates, amount of spoilage, etc.).

B. SIGNIFICANCE OF RESEARCH

To date, the process for ordering, procuring, shipping, receiving, and distributing produce to South Korean DECA customers has never been fully documented. It is extremely difficult to measure the effectiveness of a process without first documenting it and understanding all of the key components and activities involved.

This thesis documents the process involved and attempts to analyze it to determine the overall effectiveness. Once the process is documented, strengths and weaknesses are identified and possible improvements are recommended.

DSCP and Korean produce customers are the intended primary beneficiaries of this study. By recording the strengths and weaknesses of the current practices, DSCP logistics planners can more effectively provide superior products and customer service to South Korean produce customers.

C. RESEARCH METHODOLOGY

Research for this thesis is confined to processes for ordering, procuring, shipping, receiving and distributing certain produce items to selected South Korean DECA customers. The thesis focuses on high volume line items and the largest South Korean DECA customers, the analysis of which may be applied to similar line items and similar customers.

This thesis includes research into applicable literature and web-sites, along with information and observations from personnel in the following government organizations: DSCP (Headquarters, Philadelphia, PA and Pacific, Alameda, CA.), Defense Subsistence Office (DSO), San Francisco, CA, DECA (Northwest Region, Seattle, WA, and DECA South Korea), the U.S. Department of Agriculture, and the University of California, Davis.

Additionally, representatives from the following private enterprises were interviewed: American President Lines (APL), Sea Land, Federal Express, TransFRESH, P.E.B. Commodities, Inc., and Australia-New Zealand Direct Line (ANZDL).

Thesis conclusions and recommendations will represent some of the opinions advanced by these sources.

D. THESIS ORGANIZATION

The remainder of this thesis is organized as follows: Chapter II introduces the parties involved in the ordering, procurement, shipping, and receiving of produce bound for Korean DoD customers. Chapter III provides a detailed synopsis of the actual ordering process, while Chapter IV explains the shipping process. Chapter V furnishes an analysis of the process as a whole and Chapter VI provides conclusions of the previous analysis along with findings and recommendations for improvement and future study.

II. BACKGROUND

A. THE HISTORY OF DSCP

Prior to 1940, each military service was responsible for the procurement and distribution of their own subsistence items. In 1941, based on the recommendation of the Hoover Commission study to centralize perishable food management into one organization, the Market Center System was established under the Army Quartermaster Corps (QMC).

Throughout the 1940s and 1950s, the mission of the QMC Market Center System expanded rapidly. A major development occurred in 1953, when an initiative to centrally procure semi-perishable subsistence and operational rations was undertaken.

Change continued in the 1960's with the establishment of the Defense Supply Agency (now the Defense Logistics Agency) to further centralize the management of common items for the military, including subsistence. In 1965, the Defense Subsistence Supply Center, the Defense Clothing and Textile Supply Center, and the Defense Medical Supply Center

were consolidated to form what is now known as the Defense Supply Center Philadelphia (DSCP).

The first test for the newly formed DSCP was the buildup and escalation of the Vietnam War. In 1966, DSCP performed what was then a logistics miracle by transporting refrigerated storage boxes filled with fresh fruit and vegetables to Vietnam. Prior to this accomplishment, the demand for food was largely for canned and dehydrated items, which were non-perishable. [DSCP 98]

B. DSCP TODAY

DSCP operates as a Primary Field Level Activity of the Defense Logistics Agency (DLA) whose mission is to ensure the combat readiness and sustainment of America's fighting forces by providing world class logistical support in peace and war. They provide over $3.4 billion of food, clothing and textiles, medicines and medicinal supplies to America's military members worldwide as well as other federal customers.

The DSCP Directorate for Subsistence annually buys over $1.1 billion of food products for over 1,800 troop-issue and resale commissaries worldwide. In making these purchases,

the Subsistence Directorate uses the latest commercial business practices of the food industry wherever possible, including such initiatives as prime vendor distributors, long-term and best value contracting, and electronic commerce/electronic data interchange. [DSCP 98]

C. DSCP STRUCTURE

DSCP has continued a downward trend in employment that matches the drop in gross sales from military troop restructuring. Since 1995, DSCP has reduced its workforce by seven percent while gross sales dropped by only five percent. This " right-sizing" was promoted by initiatives designed to improve the way it does business. DSCP currently has 10 commodity business units; each concentrating on a category of items (e.g. fresh fruits and vegetables). [DPSC 98]

There are two DSCP field locations that provide direct service for perishable subsistence: DSCP Pacific in Alameda, CA, and DSCP Europe, located in Mainz Kastel, Germany. There are branch administrative offices ranging from Fort Detrick, MD, to Copenhagen, Denmark. [DSCP 98] This thesis concentrates on the operations of DSCP Pacific and Defense

Subsistence Office (DSO), San Francisco. Specifically, the area under the Subsistence Commodity Business Units entailing produce shipped out of DSO San Francisco will be examined in detail.

D. DSCP-PACIFIC

1. Organization

DSCP-Pacific consists of 23 people located in the Pacific region who are administratively responsible for providing 388 customers with food, clothing and medical items. Their clientele include 98 Defense Commissary Agency customers, 20 Air Force customers, 18 Army customers, 17 Navy customers, 182 ships of the Pacific Fleet, and 53 non-defense customers.

DSCP-Pacific is one of two major field offices for DSCP in Philadelphia. DSCP-Pacific is the marketing agent for subsistence, clothing and textile business involving customers in the Pacific, including Guam, Korea, Japan, Okinawa, and various other smaller customer locations. [Allman 98]

2. Significant Improvements

Recent significant improvements in DSCP operations have included adding a " tri-commodity logistics representative" in Korea, Japan, Hawaii, and Alaska; establishing a local purchase program for the purchase of fresh fruits and vegetables (FF&V) in Japan; and assisting in the roll-out of the Extended Shelf Life (ESL) milk contracts for Okinawa and Korea, ending a decades-old dependence on reconstituted milk. [DSCP 98]

Another DSCP success story has resulted from their support for the implementation of the Controlled Atmosphere Reliable Transportation System (CARTS). CARTS involves the use of atmosphere controlled containers to extend the shelf-life or freshness of FF&V during surface shipments. [Rodde 98] By prolonging the shelf-life, the CARTS system has reduced the DSO's dependence on air transportation and greatly reduced transportation costs overall.

Additionally, DSCP initiated a contract freight forwarder for FF&V in Japan and Korea, resulting in greatly improved delivery times and a significant cost savings overall. [Allman 97]

E. DEFENSE SUBSISTENCE OFFICES

1. Organization

Throughout the continental United States and Hawaii, there are four Defense Subsistence Offices (DSOs) and ten Terminal Market Offices (TMOs) which have operational responsibility for supplying subsistence items to various regions of the continental United States and overseas.

The DSOs are located in San Francisco, Seattle, Jacksonville, and Tidewater and are more traditional operations in that they maintain physical " ownership" of refrigeration and warehousing facilities and are the four operations with the most throughput. [Crow 98] The DSOs are staffed with an average of approximately twelve personnel and maintain responsibility for providing chilled and frozen products to their customers. Additionally, each of the remaining DSOs has responsibility for shipment to overseas customers, which is one of the reasons that they maintain their chill and freeze capability.

The TMOs are all former DSOs which have had the refrigeration and warehousing functions removed from their operations and are responsible for customers within the

Continental United States only. TMOs are produce buying offices with pick-up and delivery functions provided almost entirely by private contractors. [Amato 98] As a result, the TMOs are manned with a somewhat smaller staff of approximately eight and are no longer responsible for providing chill and frozen products to customers.

2. DSO-San Francisco

The Defense Subsistence Office (DSO)-San Francisco is located in Richmond, CA and has the operational responsibility for supplying FF&V, along with frozen and chill products to both San Francisco Bay area and Western Pacific customers. The DSO-San Francisco office is comprised of fourteen personnel, making it the second largest of the fourteen such operations in CONUS and Hawaii. Customer requirements for FF&V are received on-site. DSO personnel are accountable for the purchase, initial receipt and inspection, and the monitoring of shipments of FF&V to customers.

Because the DSO-San Francisco has operational responsibility for supplying FF&V to South Korean customers, this thesis concentrates on this office for study and

analysis. For reporting purposes, DSO-San Francisco reports to the DSCP-Pacific Region Branch Chief for perishable subsistence at DSCP-Headquarters in Philadelphia. Figure 1 shows the organizational relationship between DSO-San Francisco and DSCP-Headquarters.

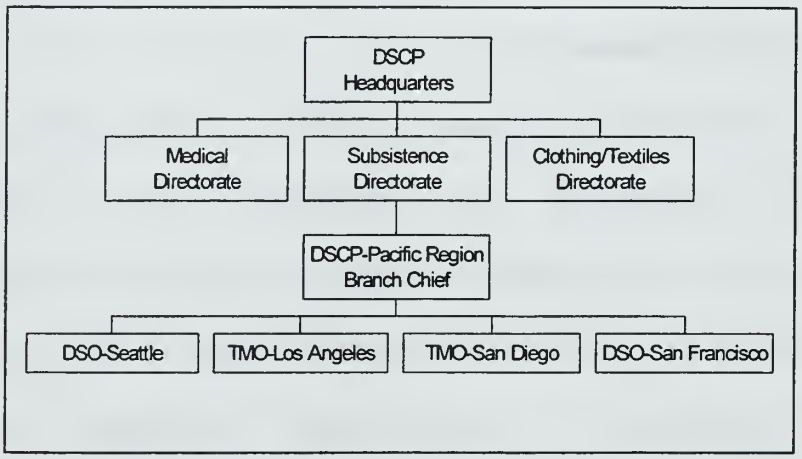


Figure 1 Organizational Relationship between DSCP Headquarters and DSO-San Francisco

3. Significant Improvements in DSO Operations

a. Controlled Atmosphere Reliable Transportation System (CARTS)

In the early 1990's, resale customers in the Western Pacific were experiencing large losses of produce upon receipt. These losses were due to an inadequate delivery process that adversely affected the arrival

condition of the commodities as well as quarantines due to insect infestation. [DSRPAC 94] The first attempt to remedy these problems was a program known as the Pacific Surface Initiative (PSI). PSI concentrated its efforts on developing a strategy to improve service to customers in Guam.

At the time of this project, the vast majority of produce was being transported via air, at approximately $1.50 per pound, a significant expenditure of appropriated dollars for transportation. Alternatives were sought within what was then known as the Defense Subsistence Region Pacific (DSRPAC) for ways to improve the quality of produce delivered to Guam's customers while simultaneously reducing the associated transportation costs.

In September 1992, initial research began on the surface shipments of commodities previously shipped by air. During the last quarter of CY92 several test shipments via surface were made with mixed loads of bananas and mangoes to Guam in controlled atmosphere (CA) vans. Results of these tests indicated that loads containing sensitive items could be successfully shipped by surface. Through an informal

partnership with commodity experts from American President Lines (APL), TransFRESH and UC Davis, the staff of DSRPAC and DSO-Alameda were able to develop a methodology for combining various items, previously thought to be incompatible, in one van using CA technology.

The strategy for improving product quality, increasing predictability of delivery, and minimizing transportation costs was built on the use of CA technology and a baseline ordering system. The CA vans optimized the quality of the product and the baseline system achieved timeliness and predictability of delivery. Ultimately the combination of the two resulted in a reduction in the cost of transportation.

The PSI program resulted in approximately 95 percent of all commodities shipped utilizing this new method reaching the customer in " marketable condition." Consistency of delivery was achieved with a 19 to 21 day order ship time and a $2.8 million reduction in the expenditure of transportation dollars for the shipment of produce to Guam. [DSRPAC 94]

Controlled Atmosphere (CA) technology operates under the presumption that it is possible to substantially retard the maturation process and preserve shelf life of produce by subjecting it to its optimum temperature, gas mix, and relative humidity. A CA container van is one that closely regulates temperature, permits an altered gas mix and has some relative humidity controls. It is also equipped with an onboard computer, which aids in maintaining the various settings as well as selecting and storing information regarding temperature, gas mix, and relative humidity throughout the van's voyage.

Under normal atmospheric conditions, nitrogen comprises slightly more than 78% of the air, while oxygen and carbon dioxide make up 21% and just less than 1%, respectively. The CA technology used by DSO-San Francisco is furnished by the company TransFRESH. Controlled atmospheres in these vans are initiated by purging the storage atmosphere with liquid nitrogen to reduce the oxygen concentration, followed by an injection of carbon dioxide gas, if necessary, to produce the desired mix. [Rodde 98]

While being shipped, the produce may generate its own modified atmosphere. During the respiration process, oxygen is consumed and carbon dioxide is expelled. High levels of carbon dioxide may be damaging to the produce, so TransFRESH employs a carbon dioxide scrubber comprised of hydrated lime to absorb excess carbon dioxide. The computer monitors the container gas level with a carbon dioxide sensor and activates the scrubber when the preset concentration is exceeded. [DSRPAC 94]

The TransFRESH system used by DSO-San Francisco is a " passive system" , in that it doesn't actively maintain atmospheres unless preset concentrations are exceeded. There are numerous " active systems" now being used, but all are significantly more expensive and in some cases much more difficult to use logistically. [Rodde 98]

The success of the CA system is dependent upon a number of variables, including the produce variety, physiological age, atmospheric conditions, temperature and time. At the initial harvesting of the produce, temperature is the most critical variable. During the transportation and distribution cycles, however, unfavorable conditions

among any of the other variables can and does result in loss of the product.

In addition to the aforementioned variables, TRANSfresh CA containers are most effective when they are more than 50 percent full. The TRANSfresh system operates passively and only adjusts the container atmosphere when the produce inside has respired to the point where Carbon Dioxide levels are no longer within specifications. If a container is less than 50 percent full, the produce will respire longer and more rapidly until the atmosphere of the abundance of empty space in the container has gone out of specifications. Longer and more rapid respiration results in quicker maturation and shorter shelf-life for the produce. [Rodde 98]

Transporting incompatible products together can result in loss of product quality and market value. A few idiosyncrasies in the shipping of produce include the fact that celery absorbs odors from onions, apples and carrots; odor from grapes fumigated with sulfur dioxide is absorbed by other fruits and vegetables; and apricots are producers of ethylene during respiration and, therefore, are not to be

loaded into the same van as cauliflower, which, although requiring the same transit temperature (34-36 degrees F.) suffers deleterious effects if exposed to ethylene.

The CARTS program has continued to expand since the early 1990s and is now used for deliveries to additional countries, including shipments to South Korea. Recent advances in CARTS have allowed the DSO the ability to maximize van-load capacity from CONUS to overseas customers by permitting the shipment of compatible FF&V products in the same container. Previously, only single line-items were packed in the same container and the container was not shipped until enough customers had ordered sufficient quantities of a single product to fill the van completely. CARTS technology allows the storage of a variety of compatible items in the same shipping container. This, in turn, results in more flexibility in loading and the potential to maximize the use of the space available in containers.

b. Use of Freight Forwarders

In addition to the use of CARTS, the recent use of the freight forwarders in Korea has proven to have a

positive affect on customer service by allowing the DSO to maximize van-load capacity. The freight forwarder holds half of the goods in a warehouse close to the port facility, then moves the commodities to the local customers multiple times during the week (instead of once a week). Items are delivered using a multiple-stop delivery method in trucks, which are properly loaded to deliver to each customer. By delivering less and with more frequency, the produce manager is better able to receive, store, and merchandise the items. Maximizing van-load capacity is important because economies of scale can be achieved if fewer vehicles, with full loads, are used instead of sending separate vehicles only partially full to each customer.

Additionally, the transport of product via vans is more expensive than storage and distribution at a site close to the end-user. This allows the DSO to ship large quantities of hardy items less frequently from CONUS because the produce is accumulated and held at a storage site in Korea until the customer is ready for it. [Kerber 97]

F. THE ACTUAL CARRIERS

DSO-San Francisco does not perform the actual function of shipping FF&V to South Korean customers. For this tasking, DSO-San Francisco contracts with three carriers; two for surface transportation and one for air.

1. Surface Transportation

Surface transportation of FF&V is handled by American President Lines (APL) and Sealand. Because APL won the current competitive bid for the contract, they receive a sixty percent share of the business to Sealand's forty percent. For this reason, the author focuses on APL when discussing the shipping operations.

Both APL and Sealand use containers that utilize Controlled Atmosphere equipment developed and maintained by TransFRESH in Salinas, CA. TransFRESH containers are programmed by technicians and electronically controlled to maintain prescribed atmosphere levels, which are most beneficial to the commodities, loaded. Using CA systems in conjunction with temperature control adds days of shelf-life to produce by reducing the respiration rate and thereby slowing the rate of decay. It also increases the

compatibility of different items, such that a variety of products can be shipped together to maximize van-loads.

The TransFRESH system is a passive system. It adjusts atmospheres as required as opposed to other available systems, which actively maintain atmospheres. This passive system is significantly less expensive than an active system. The TRANSfresh system adds approximately $650 to a container as opposed to some active systems which can add as much as $7,500 - $15,000 per container. [Rodde 98] Because of the low capital investment required, both APL and Sealand have made extensive use of the TransFRESH passive CA system.

2. Air Transportation

Air transportation of produce to South Korea is handled by Federal Express (FEDEX). FEDEX has had the contract to provide this service to Korea for the past five years with shipments from San Francisco's International airport. Material is purchased and delivered to the DSO-San Francisco warehouse where it is then packed into special shipping containers. At this point, FEDEX begins its " door to door" service by picking up the containers and transporting

them to the airport for immediate loading onto the FEDEX plane for delivery.

FEDEX operates under variable time constraints depending upon the distance to the final customer on arriving in country. They are required by contract to deliver within a three hour window of the scheduled delivery time. By contract, this must be accomplished at least 90 percent of the time. [Caputo 98]

3. Freight Forwarders

Once material arrives in South Korea, it is handled by two freight forwarders as it makes its way to the receiving customers. The freight forwarder for surface material is a subsidiary company of APL known as American Consolidated Services (ACS). Material delivered via air is handled by a subsidiary company of FEDEX called Raymond's Express International (REI). In both instances, the freight forwarders subcontract with local transportation companies to transfer the product to the final customer, but in neither case do they relinquish responsibility for prompt delivery.

III. CUSTOMERS AND THE ORDERING PROCESS

A. SOUTH KOREAN DOD CUSTOMERS

Different customers of produce shipments to Korea have different requirements and sometimes require different types of transportation. DSO-San Francisco delivers to two primary categories of customers in Korea: Troop customers, and resale activities or DECA customers.

Troop activities include the Army 6th Support Center, while resale activities in Korea include the DECA commissaries at Youngsan, Osan, Teagu. A third type of customer in Korea is the Dragon Hill Lodge on the Youngsan Army Post in Seoul. The Dragon Hill Lodge is a hotel/restaurant complex that is operated by the Morale, Welfare, and Recreation (MWR) organization. For the purposes of this thesis, the Dragon Hill will be considered as a resale activity. Figure 2 lists the major organizations in South Korea for that DSCP serves. Smaller facilities at Camp Casey, Camp Humphrey, Camp Carroll, Kunsan Air Base, Camp Stanley, Camp Edwards, Camp Page, and Hannam Village all receive their produce through transfers from the DECA commissaries at Youngsan, Osan, and Taegu.

Resale Operations	Troop Activities
DECA Youngsan Commissary	U.S. Army 6th Support Center
DECA Osan Commissary	
DECA Teagu Commissary	
DECA Pusan Commissary	
Dragon Hill Lodge, Seoul	

Figure 2 Major DSCP DoD Customers in Korea

Because resale activities comprise the major portion of the business in South Korea, the author will concentrate on deliveries to these customers. Resale activities operate mainly under a financial system known in DLA as the Working Capital Fund. Essentially, these activities must consider costs associated with the purchase, receipt, storage, handling, and disposal of perishable products, and pass these costs along to the customer.

Theoretically, Working Capital Fund activities operate to " break even" in financial terms. " Real world" practices such as these directly relate to the manner in which they conduct business and the modes and methods for receiving products. It is certainly in the best interest of these

activities to have the most efficient system for handling and delivery of products to their locations.

The remainder of this chapter explores the process for a customer ordering a product through the final delivery of that product. Initial discussions concentrate on surface deliveries using APL as the shipper, with the latter part of the chapter examining air shipments by FEDEX.

B. THE ORDERING PROCESS

Prior to the Pacific Surface Initiative in 1991, demand for produce was determined on strictly a " pull" basis. A " pull" system infers that requirements are determined by the customer, who pulls the material from the suppliers. Surface Orders averaged approximately 120 days from order to delivery, making it nearly impossible to accurately forecast demand at the point of sale. Even airlift order and shipping time ranged from 20-30 days, initially, to just under 10 days. [DSRPAC 94]

Other problems with the old way of doing business included:

1. Poor Communication

Communication to the customer of an impending surface shipment was totally ineffective.

> Customers claimed that they had no way of knowing when a shipment was arriving until the van pulled up to their back docks. Airlift deliveries were predicated on relatively reliable flight schedules. [DSRPAC 94]

2. Poor Reliability on Delivery Dates

> A chronic inability of surface carriers to provide timely vans and equipment to the DSO. As a result, a substantial rollover in van shipping occurred where product was delayed past the customer's required date of delivery. This was further exacerbated with dock strikes, work slow downs in foreign ports, and unusually high numbers of saturated ports on Japan, Okinawa, Korea, and Guam. [DSRPAC 94]

As a result of the overall poor performance in the transportation of produce, DSCP began an aggressive initiative to improve the delivery condition of airlifted material. The first improvement involved pre-cooling the produce prior to loading it on aircraft in an effort to retard maturation and increase the shelf life of shipped produce.

DSCP then studied the air delivery process and determined that using Military Airlift Command (MAC) flights was more expensive and provided a lower level of customer service than using commercial carriers. As a result, commercial carriers began to be used for air transport of

produce with the exception of the island of Kwajalein, a practice that remains in place today. [DSRPAC 94] An infrequent number of commercial flights and a relatively small demand for produce on Kwajalein have resulted in the economic decision to maintain MAC service for produce instead of commercial carriers.

Once the problems with air transportation were alleviated, Western Pacific customers began to rely on this form of shipping in order to combat the still problematic 120 day order/shipping time by surface. Air shipment as a routine method of delivery was and is prohibitively costly. As a result, DSCP began to attack the surface shipping problems.

C. THE " PUSH" METHOD - A NEW WAY OF DOING BUSINESS

DSCP approached the surface shipping problems from a number of directions. First, they removed the " middleman" in the ordering process by having the customers send their requisitions directly to DSO-San Francisco instead of sending them to Naval Supply Depots in Guam and Japan for consolidation. DSO-San Francisco then acted as a

clearinghouse for the requisitions, a move which cut the order/shipping time in half.

Along with rerouting the requisitions, customers were asked to forecast their weekly sales in an effort to establish a baseline for periodic shipments of FF&V. Instead of shipping items based on actual customer requirements (pull), the same items were to be shipped with regularity based on historical demand (push).

While this idea seemed logical to DSO-San Francisco, it was very difficult to implement at the customer level. Customers had historically assumed that previous orders would not be received on time and took measures to counter this problem by overstocking and rectifying shortages with air shipments. Customers also considered the push method as an impediment to their ability to control the inflow of requirements to their stores. DECA customers argued that their demand environment was much too dynamic and unpredictable to relinquish this control. [DSRPAC 94]

In practice, the benefits of the push method in terms of reducing order/shipping time far outweighed any perceived loss of control by the customers. By allowing the DSO to

plan load-outs regularly, properly configured shipping vans could be arranged well ahead of time and their availability guaranteed. Ensuring this availability of properly configured vans also ensured optimal compatibility of shipped produce and decreased losses at destination. As stated in [DSRPAC 94]:

> This approach is similar to " just in time" deliveries. A portion of every commodity will be delivered weekly or bi-weekly, consistent with the customer's own stated demands. When a customer anticipates a fluctuation of demands such that quantities must be changed, notification to the DSO can easily affect such a change. The ability to pre-plan vans for optimal compatibility throughout the ordering cycle increased the range of product which can travel by the surface mode and improves the condition of the product upon delivery. By migrating product from air to surface, transportation dollars will be saved. The approach is systematic and driven by processes whose elements can be tested and measured. Continual process improvement involving customer feedback is paramount to the success of the program.

D. HOW IT WORKS NOW - SURFACE TRANSPORTATION

Continued refinements in the ordering process have contributed to the overall order/shipping time for an average surface shipment to Korea dropping to its current rate of less than 30 days. [Crow 98] To illustrate the current process, consider the Taegu commissary receiving a

shipment from APL. APL shipments to Korea leave Oakland, CA every Friday and the Pusan commissary is required to have their input in to DSO-San Francisco no later than the Wednesday of the week prior to the shipment.

In this example, the APL shipment is scheduled for Friday, March 13 and DSO-San Francisco requires the input on Wednesday, March 4. Requirements received on Wednesday are input into a locally operated software program developed during PSI by the former DSO-San Francisco chief, CDR Jim Kerber. The program coordinates demand and container requirements. These inputs are done on Thursday the 5th and then downloaded into DSCP's Fresh Fruit and Vegetable Ordering System (FFAVORS). This download is also performed on Thursday and produces official documentation for obligation of funds and bill-paying. [Crow 98] Outputs of the FFAVORS system are printed on Friday morning and given to the buyers that same day. The buyers use these lists to verify quantities already on order and make buys as necessary to cover any shortages in their original demand estimates.

The buyers at DSO-San Francisco have three methods with which they can procure produce, including:

1. Terminal Market Buys

The terminal market used by DSO-San Francisco is located in San Francisco and can be described as a large industrial park where growers bring their product to sell to bulk customers. The market is open in the early morning hours and DSO buyers are generally on-hand at approximately 3:30 a.m. to select produce and negotiate a selling price.

Once products are selected and the price is agreed upon, the terminal market vendor is responsible for transporting the produce to DSO's warehouses later that same morning. DSO-San Francisco uses the terminal market as a source for smaller quantity items and items which are to be shipped via air. [Crow 98]

2. Car-lot Buys

In the case of car-lot buys, DSO-San Francisco buyers buy directly from growers at the field in bulk quantities which are normally shipped via surface transportation. Most produce that is purchased as a car-lot has already been picked and is located at a cooling facility near the field.

Because buyers are purchasing produce which does not have to go to the terminal market and, in effect, guaranteeing sales to the grower, DSO-San Francisco generally has more leverage with regard to price negotiations.

Once the DSO buyers have pre-inspected the produce and agreed on a price, the grower is responsible for delivery of the product to the DSO's facility at an agreed upon time; where it is inspected by U.S. Army veterinary inspectors, and loaded into the appropriate vans for shipment.

3. Source Loads

Source loading is similar to car-lots in that the DSO-San Francisco buyers are purchasing directly from the grower. In this case, however, the produce never arrives at the DSO's facility. Instead, the DSO arranges for a van to travel to the grower, and the grower is responsible for loading the van. Once containerized, the material proceeds to the appropriate ship for transport to Korea.

Once again, this method of purchase is used for larger quantities of items and is used primarily for produce that is to be shipped via surface transportation.

In addition to the purchases made by the DSO-San Francisco, South Korean customers are served by a small buying office in-country. This buying office purchases local Korean agricultural products on occasions where stock-outs exist. This method is also used to purchase some locally grown specialty items. The drawback to these purchases is price. For example, a carton of strawberries delivered from the United States could cost Korean commissary customers anywhere from twelve to fifteen dollars, while strawberries purchased from a local Korean distributor could cost as much as forty-eight dollars per carton. [Crow 98]

This disparity in price is largely attributable to tariffs charged on commercially imported produce, but not on DoD imported produce products. Additionally, unlike the price of commissary produce, the price for locally purchased produce bears the full cost of transportation.

Returning to our previous example, on Tuesday March 2, the DSO-San Francisco buyers must place their orders for all car-lot and source load buys for shipment on the following week. If the Pusan commissary had waited until Wednesday,

March 3, to provide their input, then DSO buyers must now (on Friday, March 7) visit the terminal market to correct any shortages. This is an example of the " push" method currently in use. As such, the DSO produce buyers are sometimes forced to make their best guess at what will be required in the next week's shipment.

E. HOW IT WORKS - AIR TRANSPORTATION

In the case of ordering for items to be transported by air, the process and the timeline are much more condensed. Only four Korean customers receive deliveries by air: the Youngsan, Osan, and Taegu commissaries along with the Dragon Hill Lodge. Both Youngsan and Osan receive two deliveries by air per week (Mondays and Wednesdays), while Taegu and Dragon Hill receive deliveries every Tuesday.

In order for the Youngsan and Osan commissaries to receive a Monday delivery, they must have their orders placed with the DSO by Thursday of the following week. Orders are input once again into the " Kerber program" and then downloaded to FFAVORS so that procurement documents are available on Friday morning. The buyers visit the Terminal Market early Monday morning to inspect the produce and have

it delivered to the DSO facility later that same morning. Upon arrival, the produce is loaded into special FEDEX-owned LD-3 containers for delivery to the San Francisco International airport that afternoon.

Which items are to be sent via air is a function of the receiving customer. In effect, commissary customers decide which items they want shipped by air, within certain weight limitations prescribed by DECA Headquarters. Air shipments are generally composed of, but not limited to, the shortest shelf-life items, such as strawberries. It is left to the customer to use this form of transportation to cover stock-outs and to handle last minute requirements (e.g. pumpkins for Thanksgiving). It is important to note that the receiving DECA customers never actually see any of the transportation charges involved. Other than the quota limitations placed upon them by DECA Headquarters, there is little incentive for them to economize on transportation. [Crow 98]

IV. THE SHIPPING PROCESS

A. SETTING THE STAGE FOR SURFACE SHIPMENTS

In order to understand the shipping process, consider a regular APL shipment that leaves from the port of Oakland every Friday at 1700. The shipping process begins the week prior to the actual shipment when a representative from DSO-San Francisco contacts APL with an order for containers that need to be made available the following week. This ordering is done on Wednesday or Thursday, depending on the time that orders are received from customers. In order to explain the time-line involved, consider that the containers were ordered on Wednesday, day 1 in the process.

In general, the ordering of containers is another example of " push" logistics in action, as many times DSO orders containers without complete information regarding the following week's shipment. [Crow 98] Appendix A gives a detailed flowchart that outlines the process from the ordering of the containers until they are loaded onboard, with explanations of some of the process/quality indicators.

Once the DSO orders the containers, they are selected and inspected by TransFRESH personnel for air leakage.

Containers with a low air leakage rate are vital in maintaining Controlled Atmosphere conditions. Low air leakage rates for containers are extremely difficult to maintain over long periods of time: Due to the rough nature of loading and unloading ships, the average life of a container outfitted with TransFRESH equipment is three to four years. [Rodde 98]

Once the appropriate number of adequate containers are selected and reserved, the container numbers are documented and provided to DSO-San Francisco. L&M Trucking is notified to deliver the containers to the DSO facility (on Monday afternoon or Tuesday morning). On Wednesday, day eight, containers begin arriving at the DSO facility where they are checked by U.S. Army veterinary inspectors (vets) to make sure that van temperatures are within allowable ranges.

The proper setting of temperatures is a vital link in ensuring that an appropriate " cold chain" is maintained throughout the shipping process. By the time it is loaded into a container for shipment, the produce has already passed through three links in the cold chain, including Harvest to Initial Cooling, and Short Term storage. (Note:

The remaining two links in the cold chain are Marine Transport and Destination Handling.) Perishable fruits, vegetables, and horticulture products begin to lose quality once they are harvested. Quality losses in one link of the cold chain add to losses sustained in previous links. Product condition at final destination reflects the quality losses at each step in handling. [Thompson 98]

Once a container has passed inspection, it is loaded with the appropriate mix of produce, at which time L&M trucking is notified to pick up the containers for delivery to the container yard. All containers are required to be retrieved from the DSO-San Francisco facility no later than 1630 on Thursday. In actual practice, containers are generally picked up before noon on Thursday, day nine in the process.

Once at the container yard, the Controlled Atmosphere is infused into the containers by a TransFRESH representative. The container is then loaded on board an APL vessel for shipment with a departure time of 1700 on Friday.

B. UNDERWAY AND MAKING WAY

The average transit time from Oakland to the port of Pusan, South Korea, is approximately seventeen to eighteen days. For the sake of this thesis, the author will assume that the shipment leaves Oakland on day ten and arrives in Korea on day 28. Seven days prior to arrival, day 21 in this example, ACS receives documentation from DSO-San Francisco, while APL confirms the actual container numbers of their FF&V containers. A detailed flow-chart explaining the entire process of this second segment of the shipping process is provided by Appendix B.

On day 24, ACS prepares delivery manifests for consignees and stuffing orders for the warehouse. On the day before the ship's arrival, the APL vessel informs ACS of their estimated time of arrival and container availability. Upon receipt of this information, ACS places an order for trucks to pick up the containers at the APL terminal and transport them to cold storage. For trucking, ACS uses a local subcontractor known as Suhkyong Trucking. Another local company, Ssangyong, is used to provide interim product storage.

Upon arrival, the appropriate containers are offloaded and an ACS transportation agent picks up the sealed 40-foot Seavans and takes them directly to the ACS operational loading/unloading docks. At the time of the offload, the contractor verifies and breaks the seal and takes photos of the produce immediately upon opening the vans. The FF&V is then promptly inspected by the Army Vet and moved to the appropriate ACS storage box. [Mulling 98]

Upon completion of the offload, the ACS crew re-palletizes the produce according to customer orders and has the material loaded on trucks and headed to its final customer. On average, this happens twelve hours after receipt of the Seavan. Delivery to final customers is contracted to occur no later than 36 hours after initial receipt of the Seavan. ACS has demonstrated excellent performance results in virtually all aspects of the distribution cycle. [Mulling 98]

If customers receive produce which is not fit for resale, they are instructed to submit Reports of Discrepancy (RODs) for losses greater than 100 dollars. RODs are then sent to DSO-San Francisco for review and possible credit

payment. Additionally, each CA container electronically records atmospheric and temperature information for the entire voyage. An example print-out is displayed in Appendix C. Since this information is not closely monitored, it is useless in determining long term solutions to product mix and/or CA problems.

C. AIR SHIPMENTS

Only the four largest resale customers in Korea, the commissaries at Youngsan, Osan, and Teagu, along with the Dragon Hill Lodge receive initial shipments of produce by air transportation. They do, however, share the wealth by transferring a portion of their receipts to other activities.

Consider a Monday shipment of produce to the Youngsan commissary in Seoul as an example. Orders for this Monday shipment must be received by the DSO no later than Thursday of the previous week. As discussed in Chapter III, documentation is prepared on Friday and the terminal market purchase is made on Monday morning.

The terminal market vendor is responsible for delivery of the produce to the DSO-San Francisco facility later on

Monday morning. Upon receipt and inspection by the Army vets at DSO, the produce is maintained at cool temperatures while being loaded into specialized containers designated as LD-3 and A-2 containers which are specially designed for air travel. These containers can hold approximately 3500 pounds or 50-85 cases of produce. [Crow 98]

In both cases, the air containers are much smaller than surface containers and are not outfitted with any CA equipment. Because of the short time-frame for air shipments and the lack of CA equipment, the produce is much less sensitive to product mixing. The major concern during air shipments is in regards to temperature control within the cold chain. DSO-San Francisco currently uses various methods to preserve the cold chain during the air transit, including insulated quilts which help maintain the cool internal product temperature, and iced jell packs, which are used to cool the produce.

Once the material is loaded into the appropriate containers, Chris's Trucking, a subcontractor for FEDEX, picks up the containers for delivery to the San Francisco International Airport, where they are loaded on a FEDEX

flight bound for Seoul. Upon arrival in Seoul, the containers are offloaded and delivered to the Youngsan commissary by another subcontractor for FEDEX, Raymond Express International (REI). The Youngsan commissary, also located in Seoul, will generally receive their produce within 48 hours from the time it was picked up by Chris's trucking from the DSO-San Francisco facility. Other customers in more remote locations generally receive their produce no later than 72 hours after pick up. [Crow 98]

FEDEX is given a 2-3 hour window in which to make the delivery to the final customer and is contracted to fall within this goal at least 90% of the time. DSCP reviews their performance on a quarterly basis to ensure compliance. [Caputo 98].

In order to receive payment for their services, FEDEX is required to produce an original copy of a DD-form 250 with a signature from the receiving activity. Producing this form can sometimes be much more onerous than producing a normal Government Bill of Lading or an electronic signature, as a number of different people will have handled

the documents and had a chance to lose this original copy by the end of the process. [Caputo 98]

D. NEW DEVELOPMENTS

There are a number of new developments regarding the shipment of produce to Korea which could have long-term affects on the process.

1. Going Bananas

In the area of shipping, DSO-San Francisco has begun testing a new shipping process. Approximately 960 cases of bananas picked early in Ecuador are loaded in containers while still in an unripened green condition. After one stop in San Pedro, the ship arrives in Oakland, where the banana containers are transferred directly to the APL ship headed to Korea. Upon arrival at Pusan, the bananas are handled by a separate freight forwarder, Y.S. Kim. Y.S. Kim has a ripening room in which they ripen approximately 350 cases of the green bananas per week prior to transporting them to final customers. The remainder of the bananas are stored in temperature controlled units and remain green until it is their turn to be ripened. [Crow 98]

There are a number of benefits from this type of arrangement, including

a) Reduced Costs

By requiring less handling of material and reducing required surface ship transportation, the DSO has allowed for an overall reduction in costs. Also, by ripening the bananas in Korea, the DSO experiences fewer losses due to spoilage.

b) Reduced Shipping Time

Once again, by removing DSO-San Francisco from the process in terms of having to handle the produce, shipping time is reduced.

c) Customer Satisfaction

A ripening room allows the final customer to receive a fresher product upon delivery.

DSO-San Francisco is investigating a similar shipping process with mangoes from South America. Another benefit is that the customer is able to enjoy produce items which may be out of season in the U.S. [Crow 98]

2. The Korean Economy

As is the case with large portions of Asia, South Korea's economy has been undergoing major problems in the latter part of 1997 and into early 1998. The Korean currency, the won, has devalued from approximately 700 won/U.S. dollar to 1800 won/U.S. dollar in the past few months. As a result of this devaluation, many DoD personnel have been purchasing more goods on the local economy where their dollars are now worth more. Estimates are that demand for produce is down approximately 50% in some commissaries, but remains constant for troop activities. Such drastic changes in demand put a strain on a process where forecasting is so important. [Crow 98]

3. And Now, For Something Completely Different…

DSCP Headquarters has recently made a decision to transfer the responsibility for the shipment of produce to Korea from DSO-San Francisco to DSO-Seattle. Contracts for shippers are currently in negotiation, but APL and FEDEX appear to be the front-runners. It is estimated that most of the required produce will continue to be source-loaded from Oakland, while some percentage of product will

originate from the Northwest. [Watts 98] At the time of this thesis, the actual process percentage breakdowns of which produce will originate from which location were unavailable.

Interviews with DSO-San Francisco and DSO-Seattle as well as an interview with a representative from DSCP have revealed the following reasons for the switch:

a) Readiness

DSCP headquarters would prefer to have two DSOs with shipping capability to overseas locations to support national security. DSO-Seattle handles shipments to customers in Alaska, which was formerly considered an overseas location. Due to recent changes in shipping regulations, Alaska is no longer considered an overseas location, so DSO-Seattle needed to add an overseas customer, in addition to Alaska, to their mix.

b) Customer Service

One of the considerations in this transfer of responsibilities was to provide a greater level of customer service to Korean customers. DSCP felt that moving the responsibilities to DSO-Seattle would reduce the work-load

on DSO-San Francisco and allow both DSO-San Francisco and DSO-Seattle to more closely manage their respective customers. Because Korean customers constitute approximately 40 percent of the produce business in the Western Pacific, transferring responsibilities for Korea to Seattle would be almost an even split. Also, DSCP considered the fact that the DSO chief in Seattle is an Army billet and most of the Korean customers are Army customers. The DSO chief in San Francisco is a Navy billet. [Amato 98]

c) Jobs

By moving this function from DSO-San Francisco to DSO-Seattle, there is a possibility that new and/or more senior civilian positions could become available at the DSO-Seattle operation, thus providing some measure of balance between the DSOs.

V. ANALYSIS OF THE PROCESS

A. THE ORDERING PROCESS - THE POSITIVES

The current ordering process is considerably better than the process used prior to the PSI in 1991. Orders now go directly to the DSO, as opposed to the prior method of being received at an overseas collection point, then passed to DSCP-Headquarters, and finally to the appropriate DSO for action. Removing the distribution layers has assisted greatly in a reduction in time from requirement determination to procurement. Before the PSI, it took approximately 45-90 days before a customer's order ever reached a DSO buyer. Today, a customer's order is normally taken for action within 48 hours of being faxed to the DSO.

In addition to timely order processing, the concept of push versus pull logistics has proven to be a very successful tool in improving customer service. Setting baselines for demand and attempting to reduce variation in ordering is important to ensure a steady flow of fresh products to customers. It is especially critical to have a predictable demand in a process where there are two to three shipments underway at any one time. [Crow 98]

B. THE ORDERING PROCESS - ROOM FOR IMPROVEMENT

The current ordering process might be improved by:

1. Improved Demand Forecasting

In the current ordering system, if a customer waits until the final day to place an order for a surface shipment, the DSO has already roughly forecasted the demand and uses the customer order to identify any deficiencies in the forecast. This process relies heavily on corporate knowledge and is susceptible to problems if key personnel are unavailable for work.

Possible options for improvement include forcing customers to input requirements three to four days earlier than the current standard or improving the current " push" method of logistics by using software that allows for better demand forecasting. A new Fresh Fruit and Vegetable Management Information System (FFVMIS) is in prototype and can provide historical demand data and allow the DSO to predict as opposed to guessing future demands. FFVMIS will also provide numerous management reports and allow the DSO to have increased visibility of orders, vendors, and customer profiles.

DSO-San Francisco currently has copious amounts of raw data available, but is unable to convert this raw data into useful management information. Simple questions such as " What is the top selling produce item for Korean customers?" are not able to be answered without pouring through a six-inch printout of delivery records. FFVMIS, or a similar program, could make available data more useful.

2. Electronic Ordering

The current ordering process involves faxing orders to the DSO, at which time the orders are input into a computer for processing. Orders could be transmitted electronically as opposed to being manually entered by DSO personnel. Process time could be shortened and accuracy could be improved.

3. More Efficient use of Air Transportation

The current practice of allowing the final customer to ship anything via air as long as he remains below his allowable weight limit could be managed more closely to improve efficiency. The author contends that air shipments should be used for reasons of short shelf-life; with all other goods transported by air on an exception or emergency

basis. Shipments by air are approximately four times as expensive as surface shipments. Increasing volume of product shipped by air is symptomatic of inaccurate ordering for surface shipments. A more closely managed process for shipments by air could save significant dollars.

C. THE SHIPPING PROCESS - THE POSITIVES

APL and Sealand are both industry leaders in moving products by sealift to any location in the Pacific Rim. Out of some 500-600 shipments per week in specialized containers, DoD comprises over one-fifth of the total shipments going to the Pacific Rim. From the perspective of the commercial shipper, DoD uses CA technology better than any other customer does. [Mensing 97]

Once produce arrives in Korea, the freight forwarders have consistently provided outstanding service in transporting material to its final destination. The use of local nationals instead of DoD civilians has drastically improved timeliness and accuracy of deliveries while also reducing the need for internal DoD manpower and storage facilities.

D. THE SHIPPING PROCESS - ROOM FOR IMPROVEMENT

In the category of shipping, the author observed the following areas which could be improved:

1. Maximize Container Loads

One of the weaknesses in the actual surface shipping process is the fact that some of the DSO's CA containers are shipped less than 50 percent full. Containers are sometimes ordered before customer requirements are known and it is not uncommon for DSO-San Francisco to have excess capacity for a shipment.

Not only does this practice fail to take advantage of economies of scale by filling containers, but it is bad for the produce. The TRANSfresh CA equipment employed by APL and used to transport DoD's produce is ineffective for loads of less than 50 percent and works best with fuller loads. [Rodde 98]

Once again, better demand forecasting, combined with increased emphasis placed on container loading practices could help ensure that a greater number of CA containers are shipped with full loads.

2. Continued use of Controlled Atmosphere Containers

The use of CA equipment has paid huge dividends by reducing the need for more expensive air shipments, while still providing quality produce to customers. A company called NITEC has been testing an active CA system by transporting freshly caught salmon from South America to Asian customers using surface shipments. The shipping time is approximately 30 days and the fish has sustained excellent freshness and taste throughout the journey. [Gast 98] DSCP and the DSOs might take advantage of similar technology for surface shipments of short shelf-life items such as strawberries instead of relying on air transportation.

3. Continued Pursuit of New Approaches to Shipping

The success story of shipping bananas and ripening them in Korea is an example of new approaches to shipping which create " win-win" situations for all involved. Reducing handling and transportation costs while providing a top quality product to customers can be compatible goals.

E. OTHER AREAS OF NOTE

Aside from the ordering and shipping processes, the author makes observations in the following areas:

1. Measuring the Process

Almost everyone interviewed by the author had a difficult time answering the same question: " How do you measure success, or how do you know that you had a good year shipping produce to Korea?"

Other than measuring the performance of the contractor with regard to timeliness, very little attention is paid to such issues as overall transportation costs and the amount of spoilage and/or the reasons for that spoilage.

The problem with transportation costs is that very few people within the actual process have any visibility of the costs. The current system promotes inefficiency and reduces the possibility of obtaining visibility.

The use of FFVMIS or a similar system to effectively track spoilage and/or its causes would be greatly beneficial to the managers of the shipping process. Currently, if a customer receives a line item of produce which has sustained spoilage and/or damage in excess of $100, he is required to

submit a Report of Discrepancy (ROD) in order to receive financial credit. RODs are eventually sent to the DSO, but are routinely received weeks after the fact, making them difficult to research.

Using FFVMIS, the DSO would have the capability to identify and track RODs as soon as they are entered. Without "real-time" information, it is impossible to determine cause and effect relationships and improve the process. For example, if a product is not in resale condition upon delivery, "real-time" information would help determine a cause, such as a bad product mix in the container; the container was less than 50 percent full and CA was ineffective; or the product was too far along in the aging process when it was originally shipped. By determining and tracking the causes of RODs, the DSO can improve both the efficiency and effectiveness of the process.

The current philosophy regarding measuring the process appears to be "we must be doing fine because the customers aren't complaining". An example of this philosophy was

demonstrated during an interview with the DSCP customer service representative in Korea, who stated:

> How do we measure customer satisfaction? Well, that's very much in my niche in the overall equation at the moment. I perform weekly visits to at least one major receiving commissary and witness the condition of products at or shortly after offload as the case may be. Sometimes I do two or more in a given week, but product received at any location is a good barometer of what was received at all locations. I am there to note any significant discrepancies, and communicate results back to the DSO and other DSCP entities as required to improve and resolve problems noted where possible…
>
> Customer Satisfaction is the primary gauge, because, that is where the rubber meets the road. We are a " Best Value" vice " Cheapest Price" organization, so we attempt to buy and provide top quality FF&V and logistics to deliver same all the time. We know if we had a good year shipping produce to Korea when customers have successful results and their clientele have expressed satisfaction with our products, which is the case currently. [Mulling 98]

2. The Move to Seattle

DSCP's transfer of responsibility for the shipment of produce to Korea from DSO-San Francisco to DSO-Seattle is a significant change and may prove to be more difficult than anticipated. The Deputy Director of Subsistence for DSCP Headquarters indicated that the transfer would improve readiness by maintaining two overseas shippers on the West

coast, while also improving customer service by splitting the duties between the two DSOs and allowing each to have more contact with the customers. [Amato 98]

Having redundancy in the form of a second overseas shipper on the West coast is logical. If a natural disaster were to cripple the shipping operation in San Francisco, it would be reassuring to know that a second shipper could " pick up the slack" as needed.

It is important to note, however, that California contributes 35 percent of the United States' total vegetable production and 44 percent of its fruit and nut production. [Cook 98] Because of this concentration of produce production, DSO-Seattle will ship more than 60 percent of its produce to Korea from California. [Amato 98] At the writing of this thesis, DSO-Seattle had not completed their plan to serve Korean customers, making it difficult to comment on the effects of managing these shipments from a remote location.

In addition to the redundancy issue, DSCP indicated that it was " too much" for a single DSO to manage all of the shipments to the Western Pacific. In 1993, DSO-San

Francisco was manned with 31 personnel and has since been reduced to its current level of 14 while maintaining its overseas and CONUS responsibilities. DSO-Seattle is manned with only 8 personnel and may be forced to add personnel as it adds the responsibility of serving Korea.

VI. CONCLUSION

In conclusion, the author has examined in detail the process of ordering, shipping and distributing produce to DoD customers in Korea. Recent advances in the areas of ordering and CA technology have resulted in tremendous improvements in the overall process since the early 1990s. The author feels that it is important for DSCP to aggressively seek continuous improvement in this process.

A. FINDINGS

1. Management Information Capabilities Need Upgrading

The ordering process is not fully automated and involves faxing and manual input of customer requirements. The actions required to process requirements are less timely and more prone to inaccuracy than it would be if it were an automated procedure.

2. Stricter Management of Produce Shipped by Air is Required

Commissary customers are able to ship any product they want by air, as long as they remain under a weight quota set by DECA. Shipments by air cost approximately four times as

much as surface shipments, and a lack of strict oversight could result in wasted transportation dollars.

3. DSCP Should Continue to Investigate Alternative Shipping Arrangements and Global Sourcing

Global Sourcing and arrangements such as the shipping of bananas to Korea for ripening are areas where DSCP can make improvements in their process. Involvement in these concepts can result in lower transportation costs and " best value" products for customers.

4. DSCP does not have a Clearly Defined Means to Measure the Success of their Process for Providing Produce to Korea

DSOs and customer service representatives of DSCP are unsure how to measure the success of the process of providing Korean customers with produce. Without clear measurements and goals, it is difficult to understand how to improve the process.

B. RECOMMENDATIONS

1. Upgrade Management Information Systems

The DSOs should upgrade their Management Information capabilities with FFVMIS or a similar program, which would allow customers to order " on-line" while also offering " real-time" management information. DSOs would then be

better able to identify and correct problems and improve their processes.

2. Stricter Management of Produce Shipped by Air

Shipments by air should be used almost entirely for short shelf-life items with other products to be shipped on an emergency or exception basis. Incentives should also be developed that would encourage commissary managers to use air transportation sparingly.

3. DSCP Should Continue to Push the Shipping Envelope

Advances in CA technology and arrangements such as the shipping of bananas to Korea for ripening in that country are both areas where DSCP should continue to devote time and effort in order to provide " best value" products for their customers.

Additionally, DSCP should pursue global sourcing as a viable alternative to shipping everything from CONUS. Bananas, mangoes and many other quality products are available from the Philippines and other, much closer locations. If DSCP could make arrangements to source load from these countries, they could substantially reduce transit times and improve service.

4. Develop a Means to Measure the Process

It is impossible to improve upon a process if a DSO doesn't know how they're doing at the moment. DSOs along with DSCP personnel are unsure how to measure the process' success. Once again, a program such as FFVMIS could provide " real-time" management data that could assist a DSO in understanding how well they're doing with regard to such performance marks as on-time deliveries, spoilage and transportation costs.

C. POSSIBLE AREAS FOR FUTURE RESEARCH

The author recommends the following topics for follow-on research:

1. Developing a Model to Measure the Process

A researcher could identify baseline measurements for various parts of the process and determine how the DSO could monitor this information on a daily/weekly/monthly basis. Examples of things to measure include percentage of spoiled material, reasons for spoilage, percentage of material arriving by the required date of delivery, and transportation costs.

2. A Comparison of the Korean Shipments by DSO-San Francisco and DSO-Seattle

A student could perform a comparison of performance between DSO-San Francisco and DSO-Seattle with regard to shipments of produce to Korea. Areas to investigate could include transportation costs, delivery performance, and percentage of spoilage.

3. Develop a Strategy to Maximize Container Loads

Containers shipped at less than 50 percent full are a poor investment with regard to efficiency and are less likely to reap the benefits of the CA environment. A student could develop a strategy to maximize container loading without adversely affecting customer service.

APPENDIX A. THE PROCESS OF RELEASING AND DELIVERING FF&V CONTAINERS TO APL'S MARINE TERMINAL FOR LOADING

The following chart outlines the process involved in ordering, preparing, transporting, and loading controlled atmosphere containers in preparation for overseas shipping.

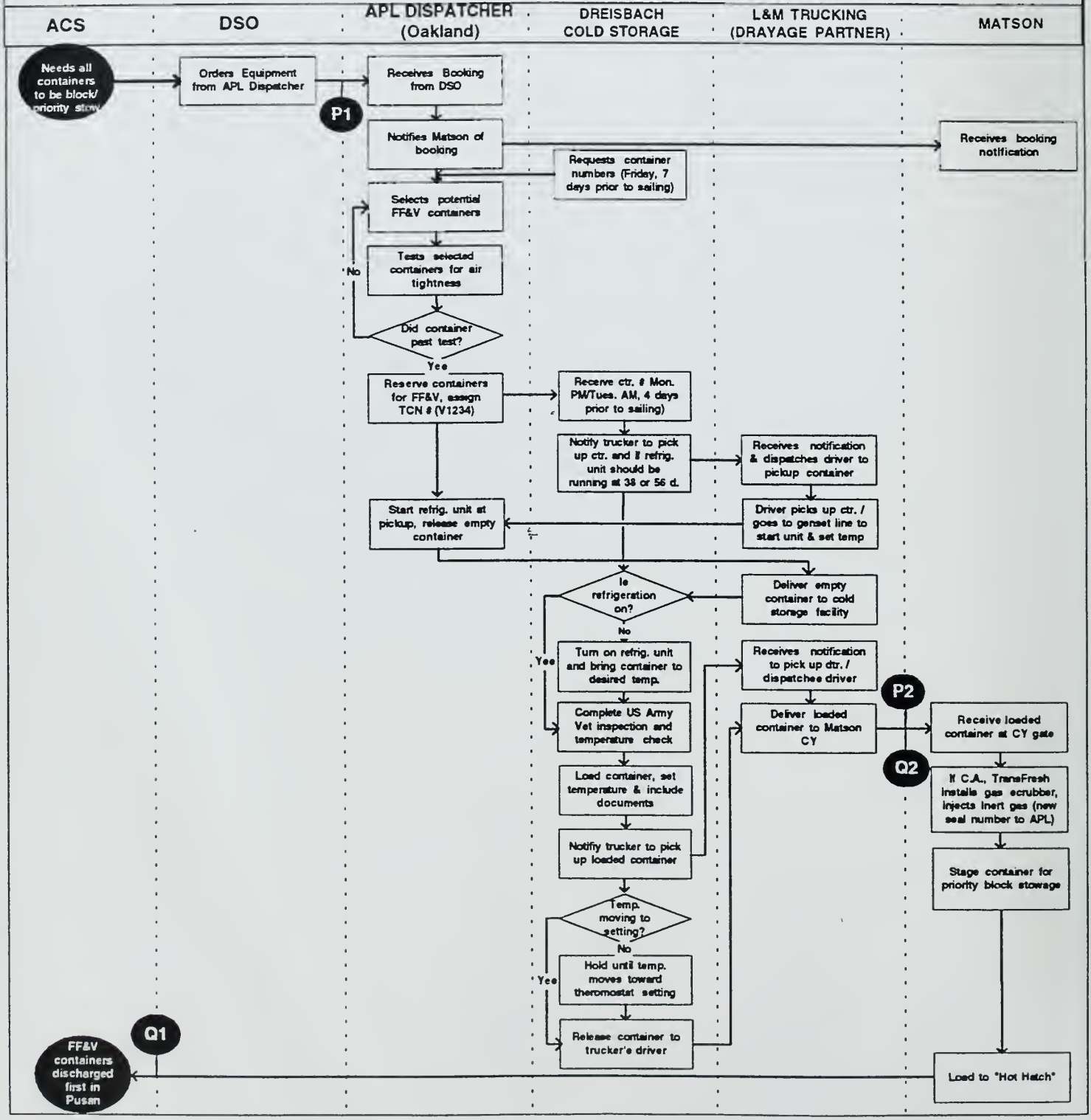
ACS
Global Distribution Solutions

DAILY PROCESS MANANGEMENT SYSTEM

Priority Process: Process of releasing and delivering FF&V containers to APL's marine terminal for priority loading.	Customer Valid Requirements: 1. Booked containers to be priority/block stowed for rapid discharge. 2. Loaded containers to be delivered prior to 1630 Thursday cutoff.
Process Owner: Defense Subsistence Office (DSO)	
Process Customer: ACS Korea/Fresh Fruit & Vegetable Coordinator	Date: 12/07/97
Outcome Quality Indicators: Q1: The number of FF&V containers that were not priority stowed. Q2: The number of containers that did not make cutoff (1630 Thursday).	Chart Page 1 of 2

OAKLAND SHIPMENT:
Ocean Carrier is Matson (APL's PS4 Service) sailing from Oakland at 1700 Friday with Cutoff at 1630 Thursday.

PROCESS FLOWCHART



ACS
Global Distribution Solutions

DAILY PROCESS MANAGEMENT SYSTEM

Business Unit: ACS

Region: North America

Location: Oakland/Korea

Process: Release and Deliver FF&V Containers for Priority Loading

Process/Quality Indicators		Checking				Miscellaneous Info.
Process control charts	Control limits	Checking Item	Frequency	Responsibility	Contingency plan	Include: • Abbreviations • Procedures • Remarks
Quality indicator charts	Specs/Targets	What to check	When to check	Who checks	Action required for exception	
Q1	Zero Occasions	Number of containers per vessel/voyage that were not block stowed	At departure of each vessel	Ocean Carrier Terminal Supervisor	Email to destination (ACS Pusan) advising of the containers not block stowed	
Q2	Zero Occasions	Number of containers per vessel/voyage that arrived post cutoff (1630 Thursday)	At each occurrence	Matson terminal gate relayed to APL Dispatcher	Cold Store must call APL for a late gate	
P1	Date of container request	The time and date the containers were requested	At each occurrence	APL dispatcher	Dispatcher to call cold store operator If request not received on time.	Objective: minimize the number of times that the container request was made less than 7 days prior to sailing (Fridays)
P2	Arrival time of each container	The time and day that each container is ingated at Matson terminal	At each occurrence	Matson gatekeeper	Count number of containers arriving at gate after cutoff	

Rev. #	Date	Revision Description	By	Approved
1	11/3/97	DPM updated to show shift from Union Cold Storage to Dreisbach Cold Storage	RLH	N/A

APPENDIX B. THE PROCESS TO RECEIVE, DISTRIBUTE AND DELIVER FF&V PRODUCTS TO CONSIGNEES IN KOREA

The following chart outlines the process involved in shipping, inspecting, forwarding and receiving produce shipments in Korea.

ACS
Global Distribution Solutions

DAILY PROCESS MANANGEMENT SYSTEM

Priority Process: Process to receive, distribute and deliver FF&V products to consignees in Korea.

Process Owner: American Consolidation Services

Process Customer: Commissary Officers & Produce Managers

Outcome Quality Indicators:
Q1: The number of times that FF&V deliveries were not made on time .
Q2: The number of times the FF&V delivery volumes did not match orders placed by produce managers .

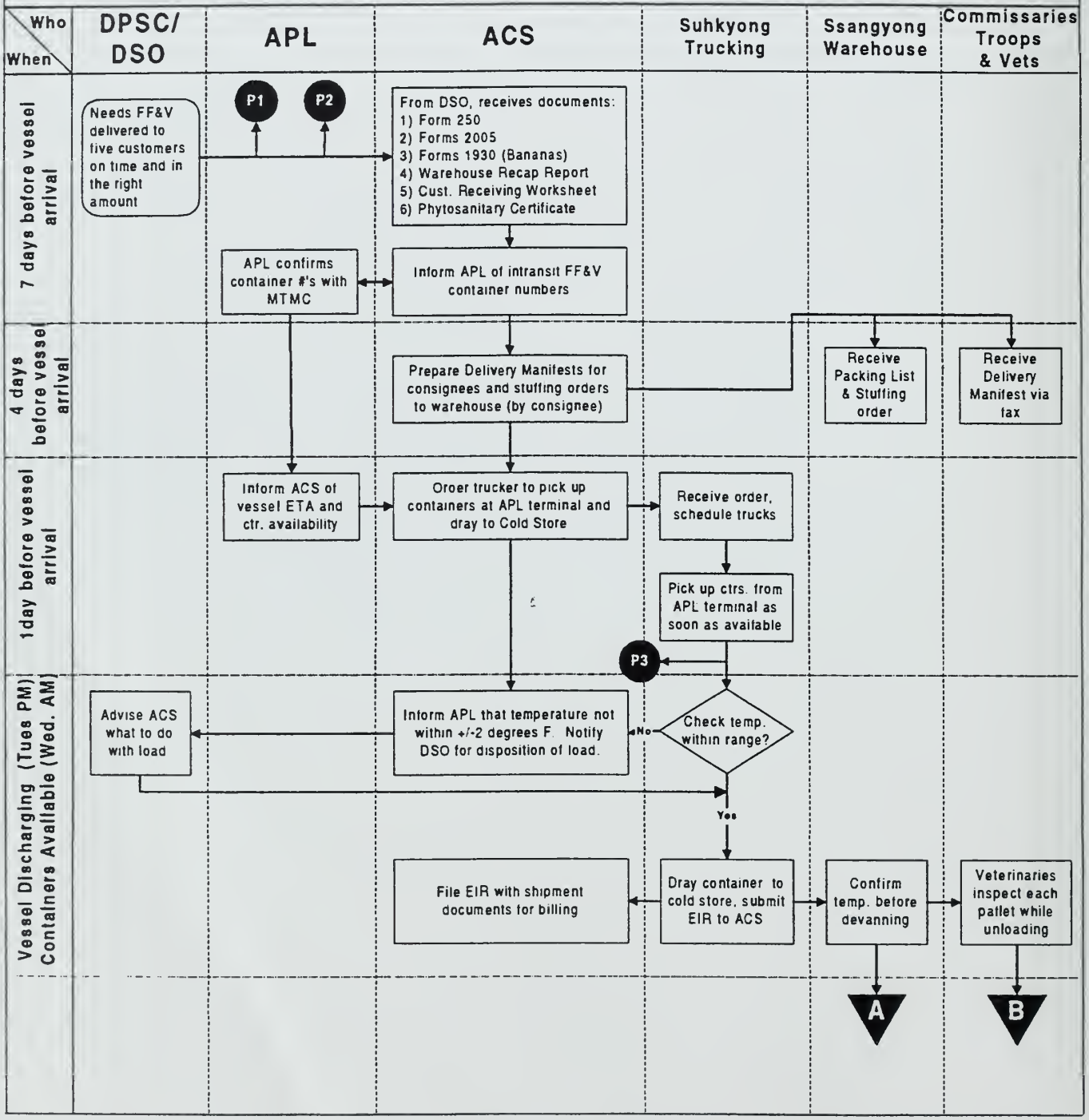
Customer Valid Requirements:
1. FF&V produce to be delivered in good condition and on time.
2. FF&V produce to be delivered in the amount ordered.

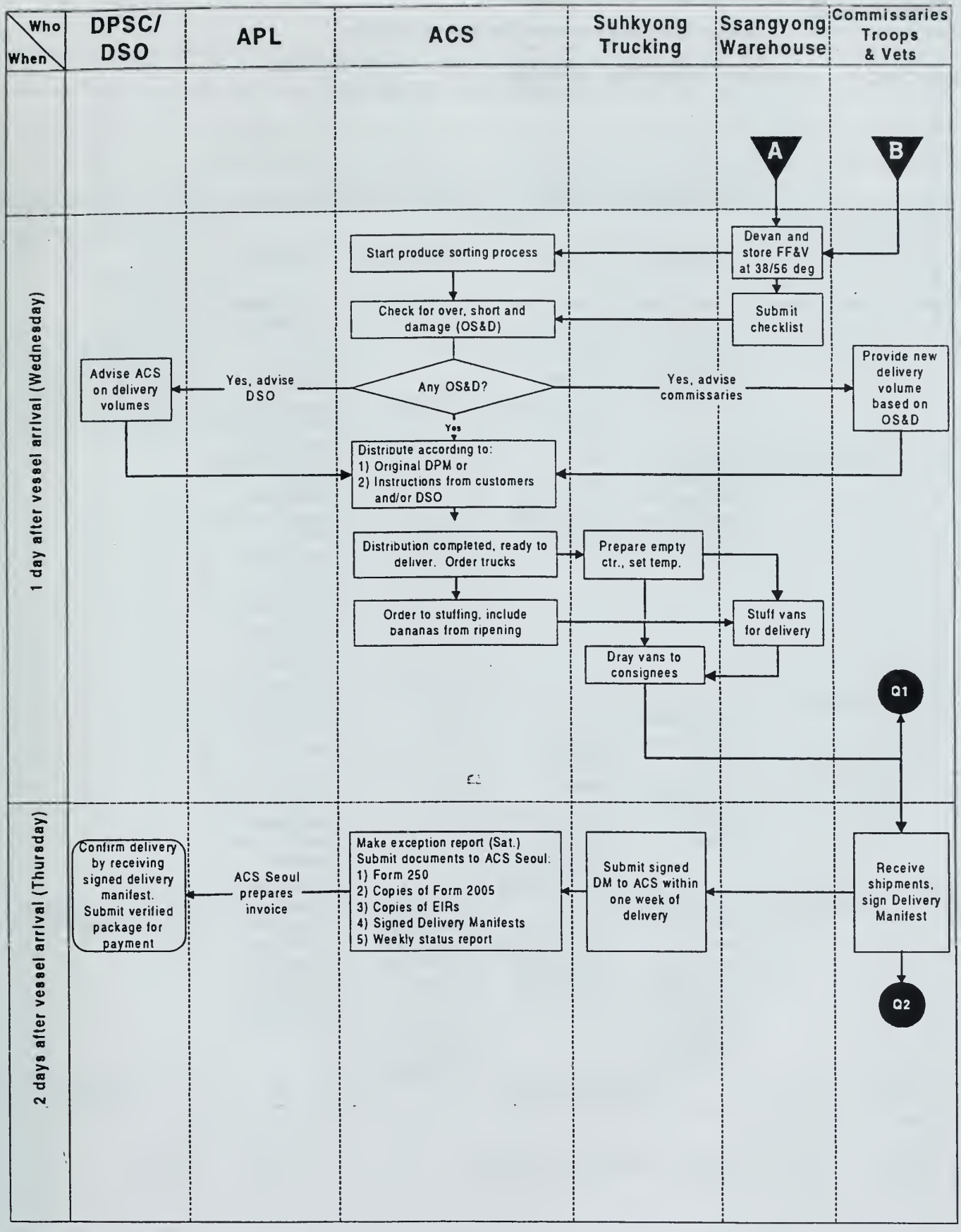
Date: 12/12/97

Chart Page 1 of 3

Assumption: Two deliveries per week.

PROCESS FLOWCHART




Who
When
DPSC/ DSO
APL
ACS
Suhkyong Trucking
Ssangyong Warehouse
Commissaries Troops & Vets
A
B
1 day after vessel arrival (Wednesday)
Start produce sorting process
Devan and store FF&V at 38/56 deg
Check for over, short and damage (OS&D)
Submit checklist
Advise ACS on delivery volumes
Yes, advise DSO
Any OS&D?
Yes, advise commissaries
Provide new delivery volume based on OS&D
Yes
Distribute according to:
1) Original DPM or
2) Instructions from customers and/or DSO
Distribution completed, ready to deliver. Order trucks
Prepare empty ctr., set temp.
Order to stuffing, include bananas from ripening
Stuff vans for delivery
Dray vans to consignees
Q1
2 days after vessel arrival (Thursday)
Confirm delivery by receiving signed delivery manifest. Submit verified package for payment
ACS Seoul prepares invoice
Make exception report (Sat.)
Submit documents to ACS Seoul:
1) Form 250
2) Copies of Form 2005
3) Copies of EIRs
4) Signed Delivery Manifests
5) Weekly status report
Submit signed DM to ACS within one week of delivery
Receive shipments, sign Delivery Manifest
Q2

ACS
Global Distribution Solutions

DAILY PROCESS MANAGEMENT SYSTEM

Business Unit:	American Consolidation Services
Region:	Asia
Location:	Korea
Process:	Receipt, Distribution & Delivery of FF&V to Consignees

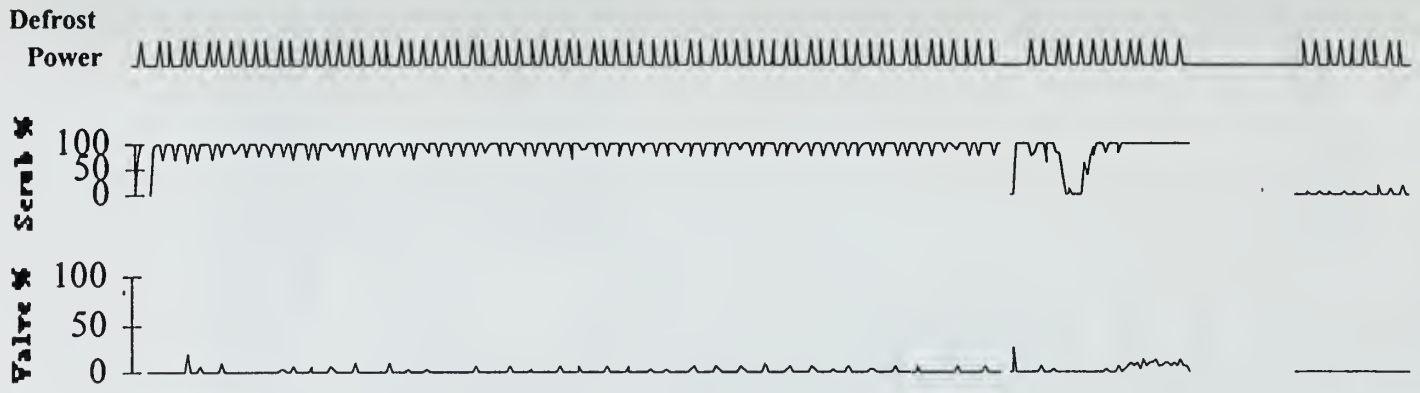
Process/Quality Indicators		Checking				Miscellaneous Info.
Process control charts	Control limits	Checking Item	Frequency	Responsibility	Contingency plan	Include: • Abbreviations • Procedures • Remarks
Quality indicator charts	Specs/Targets	What to check	When to check	Who checks	Action required for exception	
Q1	Zero Occasions	Number of times that FF&V deliveries were not made on time.	Weekly, 36 hours after container availability. Check what time Deliv. Manifest signed.	ACS ACS/ DPSC ACO	Accelerate process. Understand process failure and correct same	Container availability is when APL informs ACS that container has been discharged and ready to be picked up at ocean terminal. ACS has never exceeded the 36 hour delivery time requirement.
Q2	Zero Occasions	Number of times that FF&V deliveries did not match customer order in terms of volume.	Weekly. Check at order fulfillment and when delivered to customer.	DSO ACS/ Customer	Contact DSO and Produce Managers to negotiate delivery volumes Fill as close as possible to orders. For excess produce, deliver free of charge to the commissary who will accept it.	
P1	Zero Occasions	Number of times that documents were not received on time.	Weekly 7 days prior to arrival of shipment	DSO ACS	Contact DSO to expedite docs. Receive by fax	
P2	Zero Occasions	Number of times that documents were not accurate.	Weekly At receipt of docs and when containers are discharged and product counted.	DSO ACS	Contact DSO and Produce Managers to negotiate delivery volumes. See Q1 above.	
P3	Zero Occasions	Number of times that container reefer temperatures were not within tolerances of +/- 2 degrees Fahrenheit of settings (36/58 degrees.)	Weekly At interchange between APL and trucker and at arrival at cold storage facility	DSO or Origin Cold Storage Operator and APL enroute. Trucker/ ACS/ Cold Storage Operator (Ssangyong)	Contact DSO for advise on what to do with load. Distribute or dispose of in accordance with DSO advice.	This has never happened during current contract (2+ years.)

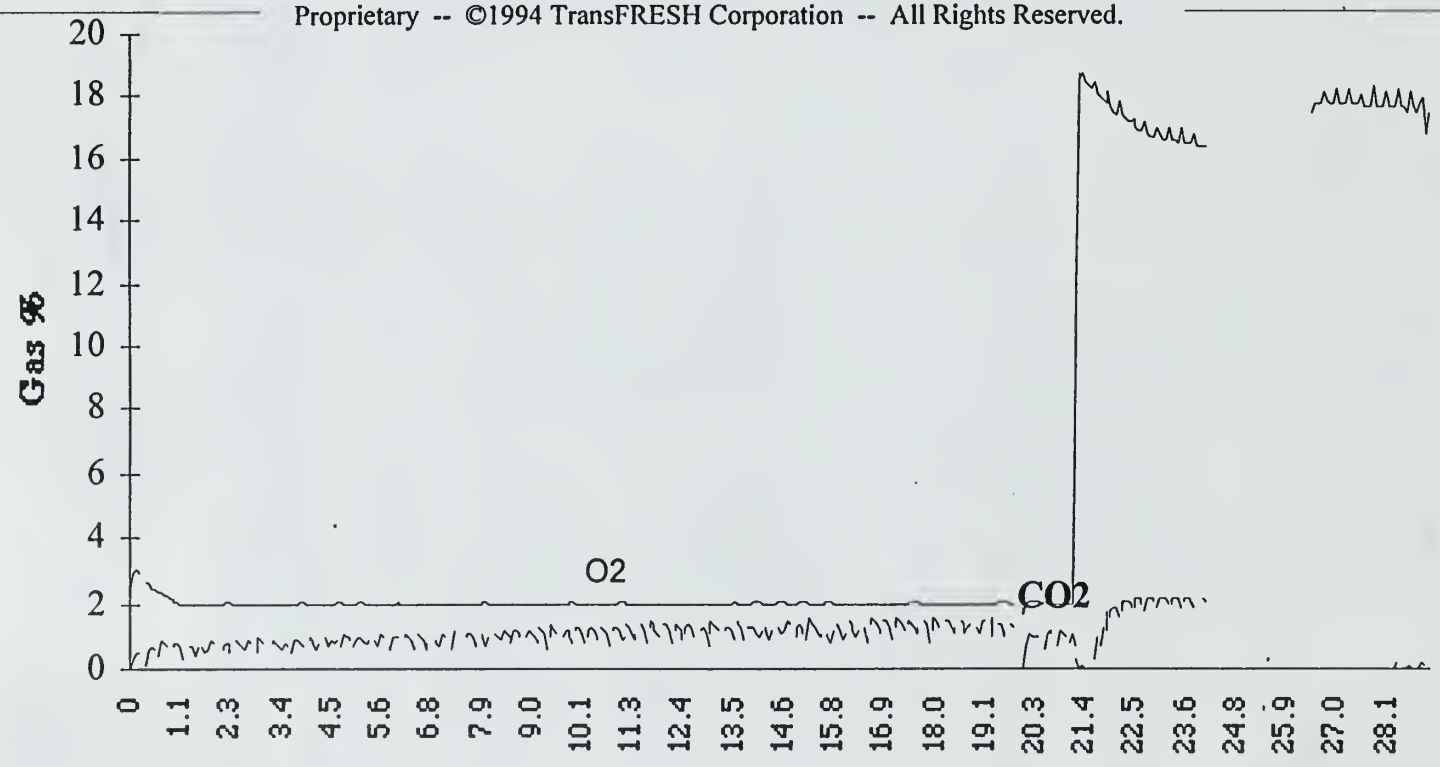
Rev. #	Date	Revision Description	By	Approved
0	12/95	Initial DPM	YS Kim & ES Lee	N/A
1	12/12/97	Updated to reflect recent process modifications	YS Kim, ES Lee & RLH	YS Kim

APPENDIX C. EXAMPLE OF A TECTROL CONTROLLED ATMOSPHERE TRIP

The following graph displays atmospheric levels during a standard shipment of produce from Oakland to Korea.

TECTROL® Controlled Atmosphere Trip: XB564182





Cargo	MILITARY VAN A1
Pulp Temp	39F
Reefer Set Point	33F
Leak Test Rate	8MIN
O2 VSP	2
CO2 VSP	2
CO2 SSP	0
Scrubber Lime	0
Free Lime	360
Purifil	7

Shipment ID	XB564182
Shipment Date	12/4/97
Customer	MILITARY
From	OAK
To	PUSSAN
Shipping Line	APL
Vessel Name	MNA
Voyage Number	19

Container ID	CRLU 5126728
Security Enclosure	SE328046
Leak Test Location	OAK
Leak Test Date	12/2/97
Serviced By	J STOUT

Controller ID	CA300610
Sensor Board ID	1194
ROM Revision	0.6
Patch Revision	9
Log Period	90
Power Down Period	30
No Power Vlv Open	1440

Comments: Status Event Log ends at 36 days.

Notes: CL 137790

Original File Name	XB564182
Date Processed	1/15/98

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